

REMARKS

The Examiner has rejected claims 1 and 3-6 under 35 USC 103 as being obvious over JP 10-278124 in view of Williams et al., stating that JP '124 discloses in Figs. 1a and 1b a plastic gear having teeth 3 on an annular portion thereof, a shaft supporting member 2, a first annular rib 5, a plurality of radially extending diametrical ribs 7 extending from an innermost side of said first annular rib toward said shaft supporting member and a first web portion 4 located between said first annular rib and said teeth, but does not disclose that the web portion would be corrugated; Williams et al. teaches in Figs. 1 and 3 a plastic gear having a corrugated web portion wherein the web portion may comprise curvilinear, two-sided or three-sided corrugations; and it would have been obvious to one of ordinary skill in the art to modify JP '124 in view of Williams et al.

In reply thereto, Applicant would like to first point out that Applicant's invention is for a plastic gear used in a precision machine such as a printer, copier, etc. and has two essential requirements as follows:

- a) it must have sufficient rigidity so as to provide less deformation against loads applied to it; and
- b) it must have high precision or accuracy in the toothed portion.

With the above two requirements in mind, Applicant respectfully submits that generally in plastic gears, in order to increase the rigidity of the webs, a plurality of diametrical ribs that extend in a radial pattern are formed and a plurality of circumferential ribs are also formed concentrically. An example of this is JP '124 cited by the Examiner. Applicant respectfully submits that these ribs are provided so as to reinforce the webs which are thin and to increase the rigidity of the webs.

Applicant respectfully submits that the reinforcing ribs described above and in JP '124 increase the thickness for the amount that is equal to the thickness of the webs. Applicant respectfully submits that this causes a problem. In particular, when the plastic gears are made by injection molding, the portion that has a rib suffers a larger contraction deformation than other portions during the process in which the melted resins are solidified. In other words, the larger the mass of the portion molded, the more contraction occurs in the resin. As a result of the difference in the contraction in the different thicknesses as the melted resins are solidified, deformation occurs in different amounts and the accuracy or precision of the plastic gear suffers.

Accordingly, Applicant respectfully submits that when such a reinforcing rib as described above and shown in JP '124 is formed near the toothed portion, the accuracy or degree of precision of the toothed portion which is one of the required elements of the gear is reduced while the strength is increased. As a result, Applicant respectfully submits that with such a construction as is suggested by JP '124 it is impossible to provide high-accuracy or high precision gears.

Still further, Applicant has recognized the problems described above and has provided a solution thereto which has the advantage of increasing the rigidity while maintaining the accuracy. To achieve this result, in Applicant's invention the diametrical ribs and circumferential ribs are provided as much as possible in the areas that have less influence on the accuracy or precision of the toothed portion even when the ribs are formed for the reinforcement purposes. In the sensitive areas of the gear that affect the accuracy of the teeth, webs in a corrugated shape, and not ribs, are formed. As a result, with this structure of Applicant's invention, it is possible to increase the strength while not influencing the accuracy or precision of the teeth. Therefore, Applicant respectfully submits that Applicant's invention is not a mere combination of "a plastic gear that has diametrical and circumferential reinforcing ribs" and "a plastic gear in which the spaces between the rim and hub are formed continuously with corrugated shape webs." Accordingly, Applicant respectfully submits that the structural feature of Applicant's invention is a portion "where only a corrugated shape web is provided and diametrical and circumferential reinforcing ribs are not provided" and a portion "where diametrical and circumferential reinforcing ribs are provided and a corrugated shape web is not provided" defined in the plastic injection molded gear of Applicant's invention and such a gear is novel and unobvious.

Applicant respectfully submits that the combination suggested by the Examiner is not Applicant's invention. Applicant respectfully submits that the combination suggested by the Examiner would instead be replacing the radially extending ribs entirely of JP '124 with a corrugated rib as in Williams et al. and a structure such as Applicant's invention. Still further, Applicant respectfully submits that the combination suggested by the Examiner could only be put together to form Applicant's invention utilizing Applicant's invention as the blueprint for doing so and as such would constitute hindsight and hindsight is not proper. Without the teachings of Applicant's invention as set forth in Applicant's invention, Applicant respectfully

submits that one of ordinary skill in the art would not be motivated or suggested to make the combination of Williams et al. and JP '124 in a manner to make or create Applicant's invention.

In view of the above, therefore, Applicant respectfully submits that claims 1 and 3-6 are not obvious over JP '124 in view of Williams et al.

The Examiner has rejected claim 2 under 35 USC 103 as being obvious over JP '124 in view of Williams et al. and further in view of Mlenjnek et al., stating that the combination of Williams et al. and JP '124 discloses all of the elements of Applicant's invention except for the utilization of the plastic gear to drive an image forming device; Mlenjnek et al. teaches a laser printer drive train using a plastic gear 18; and it would have been obvious to one of ordinary skill in the art to modify the combination of JP '124 and Williams et al. in view of the teachings of Mlenjnek et al.

In reply thereto, Applicant would like to incorporate by reference his comments above concerning Applicant's invention, JP '124 and Williams et al. In addition, while Mlenjnek et al. may disclose a plastic gear used in a laser printer drive, Applicant respectfully submits that the teachings of Mlenjnek et al. do not overcome the deficiencies of the suggested combination of Williams et al. and JP '124 which Applicant points out in Applicant's discussion of the Examiner's rejection of claims 1 and 3-6.


In view of the above, therefore, Applicant respectfully submits that not only is the combination suggested by the Examiner not Applicant's invention but also the combination suggested by the Examiner is not suggested by the art and one of ordinary skill in the art would not be motivated to make the combination in the manner suggested by the Examiner. Therefore, Applicant respectfully submits that claim 2 is not obvious over JP '124 in view of Williams et al. and further in view of Mlenjnek et al.

In view of the above, therefore, it is respectfully requested that this Amendment be entered, favorably considered and the case passed to issue.

Please charge any additional costs incurred by or in order to implement this Amendment or required by any requests for extensions of time to KODA & ANDROLIA DEPOSIT ACCOUNT NO. 11-1445.

Respectfully submitted,

KODA & ANDROLIA

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